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# Does Garment Material and its Perceived Comfort Influence Warfighter Cognitive Performance?

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**The Science Behind the Warrior:**

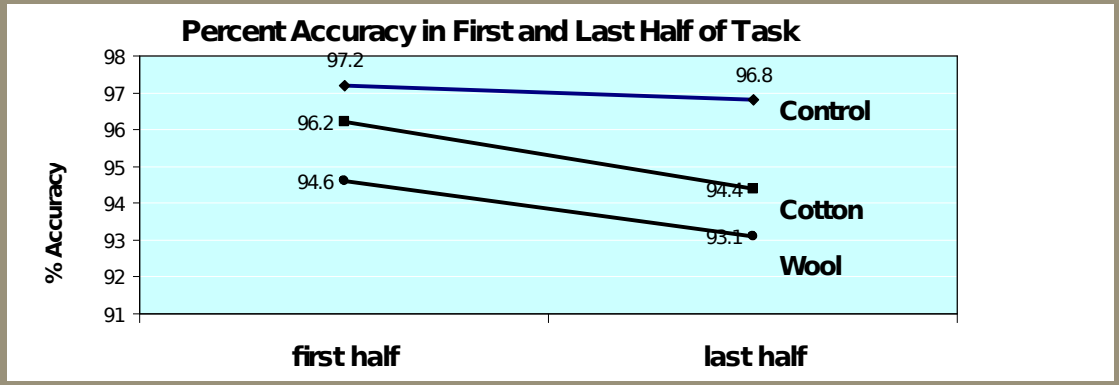
**Yesterday, Today and**

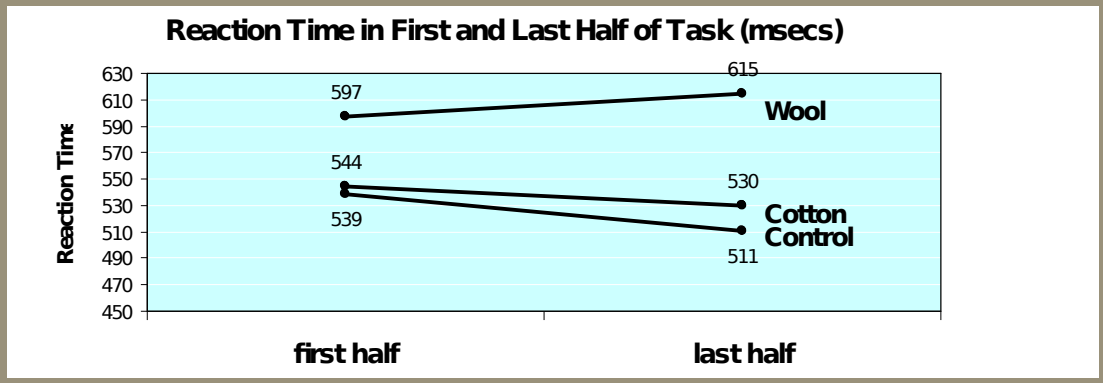
# PROBLEM

- **Little is known about the psychological effects of clothing comfort and the relationship between psychological comfort and cognitive performance.**
- **Military clothing has traditionally been developed to maximize durability while still providing a degree of ease of movement.**
  - The developmental focus has not been on comfort.
- **Future Force Warrior (FFW) system materials and designs (e.g., form-fitted garments) can pose challenges for user fit and comfort, potentially interfering with the performance of warfighters wearing protective items.**

# Background

- To date, only two studies have been conducted to assess how perception of clothing comfort affects performance.
- In the laboratory study, fabrics that differed in comfort levels were used to test the effects of clothing comfort on cognitive performance.
- Results showed that as perceived comfort decreased, reaction time and accuracy in a cognitive task was negatively affected (Bell, Cardello & Schutz, 2003).



# Background

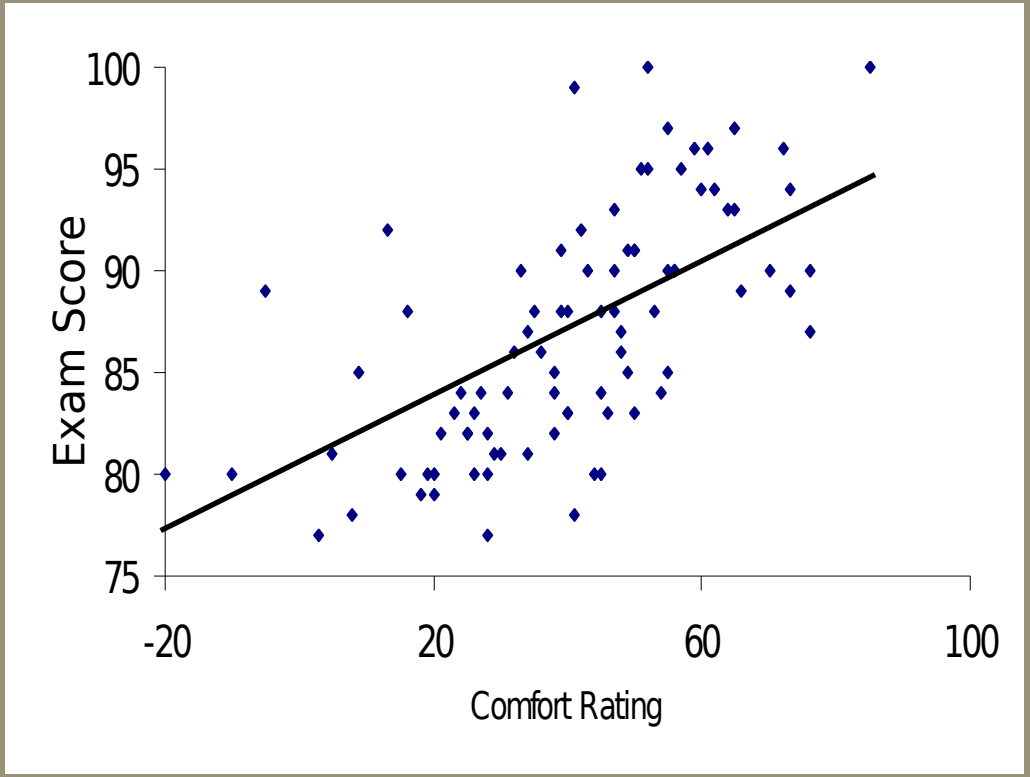
- A Field study was done to test the comfort-performance relationship under realistic conditions.
- Exam scores were compared with comfort ratings from 88 graduate students.
- Due to the desire to keep the study naturalistic, clothing was not experimentally manipulated; instead, students self-selected the clothing to wear to the exam

**Classification of Clothing Worn to Exam**

| Type of Clothing Worn | Males (n=42) | Females (n=46) |
|---|---|---|
| Formal Work Clothing | 28.6% | 30.4% |
| Casual Work Clothing | 21.4% | 43.5% |
| Casual Leisure Clothing | 33.3% | 14.9% |

# Background

- Results indicated that, while controlling for other variables associated with exam performance, there was a significant relationship between comfort ratings and exam score.
- As might be expected, the more formal attire and the lower the comfort rating, the lower was the exam score (Bell, Cardello & Schutz, 2004)



# Purpose

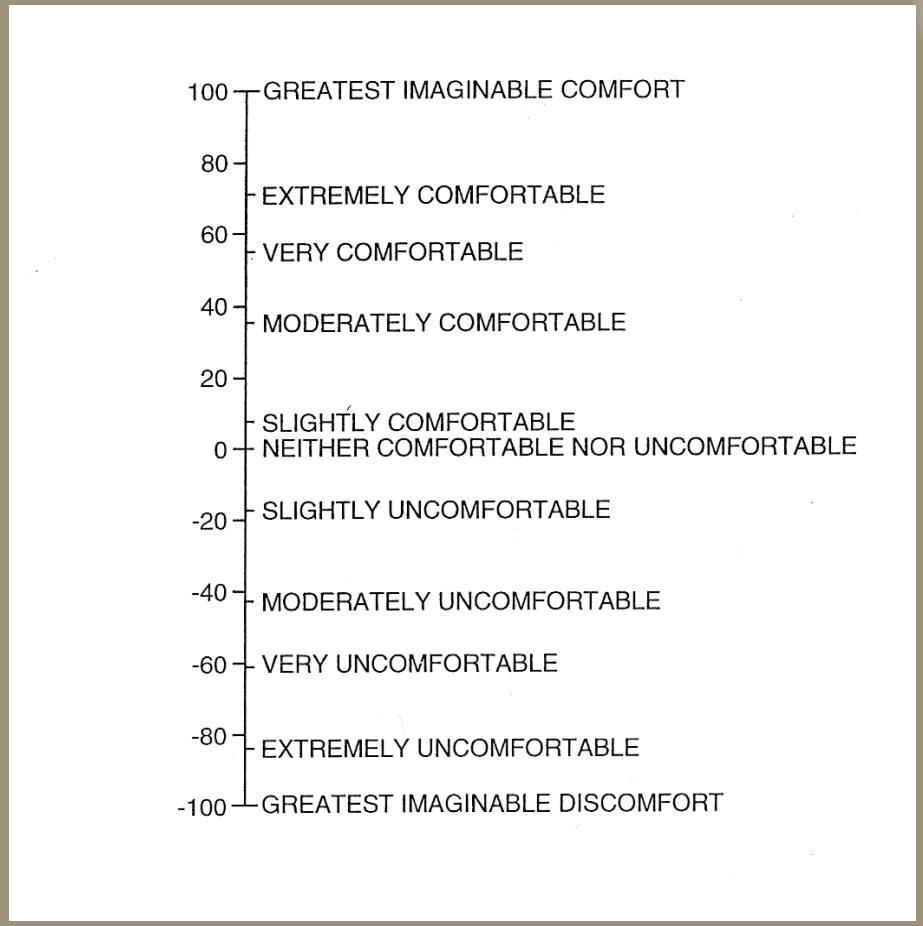
- Relate the type of material worn to the perception of the tactile comfort of that material
- Assess the effect of perceived comfort on multiple skills critical to optimal cognitive performance
- This test differed from the prior study in that it included material used for military BDU garments.

# Material Tested

- **Comfort differences were effected by creating sleeve extensions and neck dickies**
  1) a wool material (lowest in comfort based on pre-testing)
  2) a BDU polyester blend material (moderate in comfort based on pre-testing)
  3) a cotton material (highest in comfort based on pre-testing)

# Comfort Ratings

- **Volunteers were asked to indicate their level of comfort while wearing each material before the start of the tests, in the middle of the testing period and at the end of the testing period.**



# Procedure

- **27 male and female Volunteers**
- **Within subjects design**
- **Comfort conditions:**
  - No material
  - Cotton
  - BDU
  - Wool
- **Cognitive tasks**
  - Code substitution
  - Pattern Matching
  - Simultaneity task
  - Tapping

# Code Substitution Task

- **Assesses both associative memory and perceptual speed**
- **Requires competence in:**
  - Visual search mechanisms
  - Encoding of data
  - Decoding of data
  - Rote recall
- **Task duration: 90 seconds**
- **Dependent variables include:**
  - Number of correct responses
  - Reaction time

# Pattern Matching Task

- **Requires competence in visual pattern recognition and spatial memory**
- **Task duration: 90 seconds**
- **The screen displays a random pattern of asterisks for 90 seconds**
- **A blank screen then appears for 3 seconds**
- **Second pattern of asterisks displayed for 5 seconds**
- **Determination: same or different**
- **Dependent variables include:**
  - # of correct responses
  - Reaction time

# Simultaneity Task

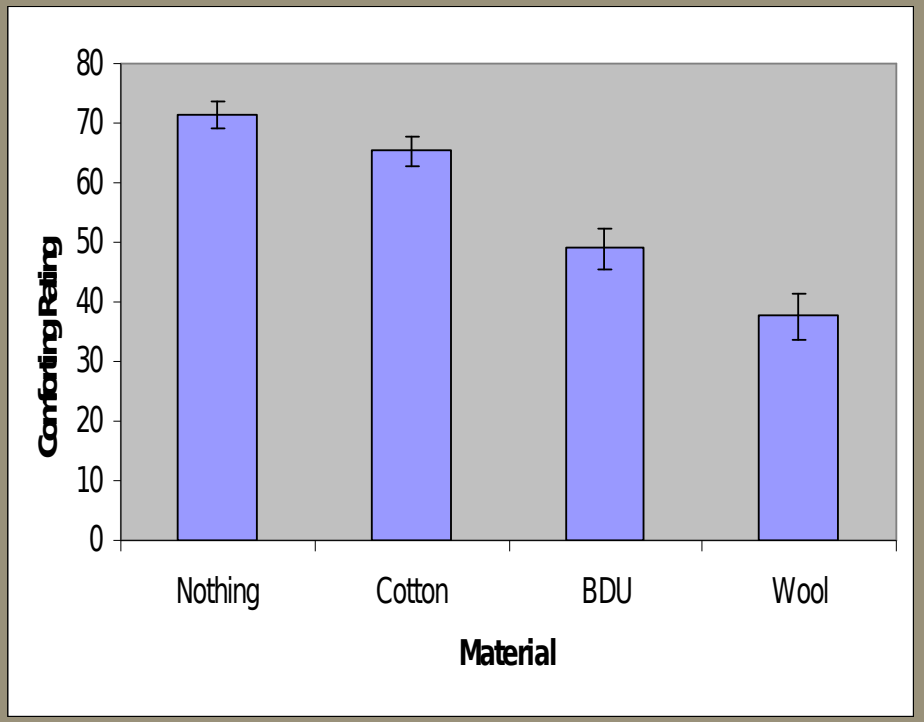
- **Requires complex visual-motor skills**
- **Measures the briefest mean interval a volunteers can perceive between the appearance of two small square symbols located on either side of a central fixation point.**
- **Inter-stimulus interval shortened automatically until errors are made and then lengthened again. This cycle is repeated several times**
- **Task duration: 60 seconds**
- **Dependent variables:**
  - # of cycles
  - Mean and standard deviation of the shortest intervals perceived

# Tapping Speed Task

- **Measures fundamental motor speed**
- **Volunteer alternately taps two specified keys as quickly as possible with the non-preferred hand**
- **Duration: three 20-second trials**
- **Dependent variable:**
  - # of successful alternations

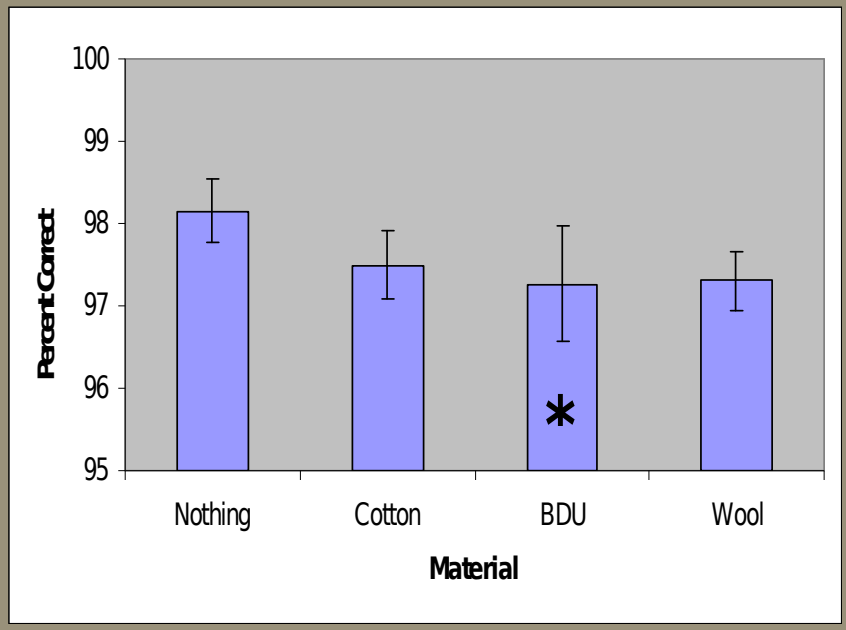
# Comfort Rating Results

- **Significant effect of material on comfort ratings**
- **All materials were different from each other in comfort**
- **With the order of greatest comfort to least comfort being as follows: no material, cotton, BDU fabric, wool.**



# Performance Results

- **Significant difference in accuracy for the pattern matching task as a function of material worn**
- **When subjects wore the BDU material, accuracy was lower compared with when no material was worn.**
- **This study provides further evidence that perceived levels of comfort could influence performance on tasks requiring short-term memory and spatial memory.**



# Implications and Future Work

- **Data suggest that comfort of military fabrics could impact a warfighter's ability to complete a range of short-term memory tasks including spatial relation recognition, e.g. orienting their position on a map as well as their location in relationship to targets of interest**

- **Future work:**
  - Effect of duration that the material is worn
  - Effect of task duration
  - Effect of task Complexity
  - Interaction of comfort with other sensory inputs on cognition, e.g. continuous versus random field related auditory stimuli